

CLAIMS

What is claimed is:

1 1. A resonator device configured with an input port at one end and a
2 termination at its other end, and for providing a frequency selective element for an
3 oscillator, the device comprising:

4 a substrate; and

5 a fractional wavelength transmission line on a surface of the substrate, and formed
6 into one or more loops thereby providing a looped-stub resonator structure,
7 wherein each edge or side of the one or more loops provides a portion of the
8 fractional wavelength.

1 2. The device of claim 1 wherein the termination is one of a capacitor, a short
2 circuit, or an open circuit.

1 3. The device of claim 1 wherein the device is a structure having a number of
2 layers, and the transmission line is located in an inner layer of the structure.

1 4. The device of claim 3 wherein the inner layer is substantially surrounded by
2 dielectric insulating material layers.

1 5. The device of claim 4 wherein electrically conducting material layers
2 connected to ground surround the dielectric insulating material layers.

1 6. The device of claim 1 wherein the device is incorporated into a voltage
2 controlled oscillator of a phase locked loop circuit.

1 7. The device of claim 1 wherein the looped-stub resonator is a metal pattern
2 formed on the substrate, and changes in oscillation frequency are accomplished by
3 physically changing the metal pattern.

8. The device of claim 1 wherein the looped-stub resonator is formed on the substrate as a metal pattern that includes a capacitive termination, and changes in oscillation frequency are accomplished by physically changing the capacitive termination.

9. A phase locked loop module comprising:

a voltage controlled oscillator circuit; and

a fractional wavelength looped-stub resonator operatively coupled to the voltage controlled oscillator circuit and having one or more loops, with each edge or side of the one or more loops providing a portion of the fractional wavelength, the resonator for providing a frequency selective element for the voltage controlled oscillator circuit.

10. The module of claim 9 wherein the looped-stub resonator has a Q of 100 or greater.

11. The module of claim 9 wherein the voltage controlled oscillator circuit and the looped-stub resonator are located on a common substrate.

12. The module of claim 9 wherein the voltage controlled oscillator circuit and the looped-stub resonator are located on different substrates.

13. The module of claim 9 wherein the module includes a number of layers and the looped-stub resonator is located on a layer that is above a dielectric insulation layer.

14. The module of claim 13 wherein the dielectric insulation layer is located above an electrically conducting material layer that is connected to ground.

15. The module of claim 9 wherein the looped-stub resonator is terminated with one of a capacitor, a short circuit, or an open circuit.

16. The module of claim 9 wherein the looped-stub resonator is a metal pattern on a substrate, and changes in oscillation frequency are accomplished by physically changing the metal pattern.

1 17. The module of claim 9 wherein the looped-stub resonator is on a substrate
2 as a metal pattern that includes a capacitive termination, and changes in oscillation
3 frequency are accomplished by physically changing the capacitive termination.

1 18. The module of claim 9 wherein the looped-stub resonator has a resonant
2 frequency higher than an output frequency of the module.

1 19. The module of claim 18 wherein one or more frequency dividers are used to
2 reduce the resonant frequency to the output frequency.

1 20. A phase locked loop module comprising: ~
2 a first layer having a voltage controlled oscillator circuit;
3 a second layer of dielectric insulating material covered with a conducting metal that
4 is connected to a ground plane;
5 a third layer having a fractional wavelength looped-stub resonator operatively
6 coupled to the voltage controlled oscillator circuit and having one or more
7 loops, with each edge or side of the one or more loops providing a portion
8 of the fractional wavelength, the resonator for providing a frequency
9 selective element for the voltage controlled oscillator circuit; and
10 a fourth layer of dielectric insulating material covered with a conducting metal that
11 is connected to the ground plane;
12 wherein the third layer is surrounded by the dielectric insulating material of the
13 second and fourth layers.

1 21. The module of claim 20 further comprising:
2 an additional layer of dielectric insulating material on the conducting metal of the
3 second layer to prevent unintended short-circuiting between the first layer
4 and the second layer.

1 ~ 22. The module of claim 20 wherein the looped-stub resonator has a resonant
2 frequency higher than an output frequency of the module.

1 23. The module of claim 22 wherein one or more frequency dividers are used to
2 reduce the resonant frequency to the output frequency.